

Quality Report



Generated with PIX4Dmapper version 4.8.0 Preview



Important: Click on the different icons for:



Help to analyze the results in the Quality Report



Additional information about the sections



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Summary



Project	P4P-RTK_TEST 120ft
Processed	2022-05-13 10:37:48
Camera Model Name(s)	FC6310R_8.8_5472x3648 (RGB)
Average Ground Sampling Distance (GSD)	1.00 cm / 0.40 in
Area Covered	0.019 km ² / 1.8716 ha / 0.01 sq. mi. / 4.6273 acres
Time for Initial Processing (without report)	06m:26s

Quality Check



Images	median of 63243 keypoints per image	
Dataset	147 out of 147 images calibrated (100%), all images enabled, 2 blocks	
Camera Optimization	2.49% relative difference between initial and optimized internal camera parameters	
Matching	median of 16234.8 matches per calibrated image	
Georeferencing	yes, 3 GCPs (3 3D), mean RMS error = 0.007 US survey foot	

Preview

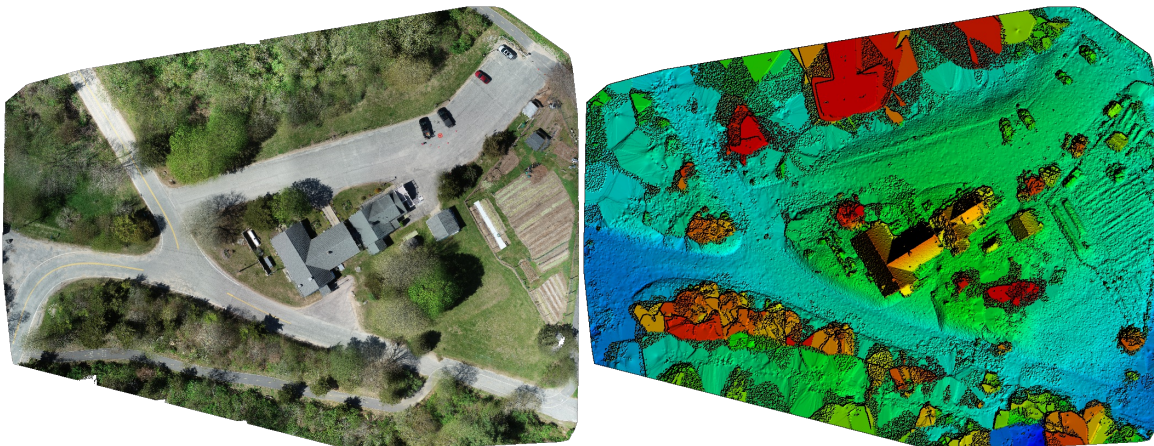


Figure 1: Orthomosaic and the corresponding sparse Digital Surface Model (DSM) before densification.

Calibration Details



Number of Calibrated Images	147 out of 147
Number of Geolocated Images	147 out of 147

Initial Image Positions

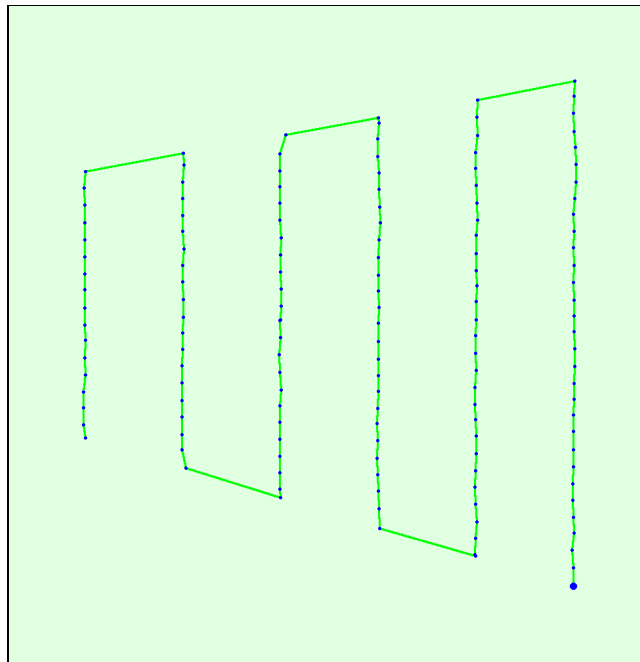
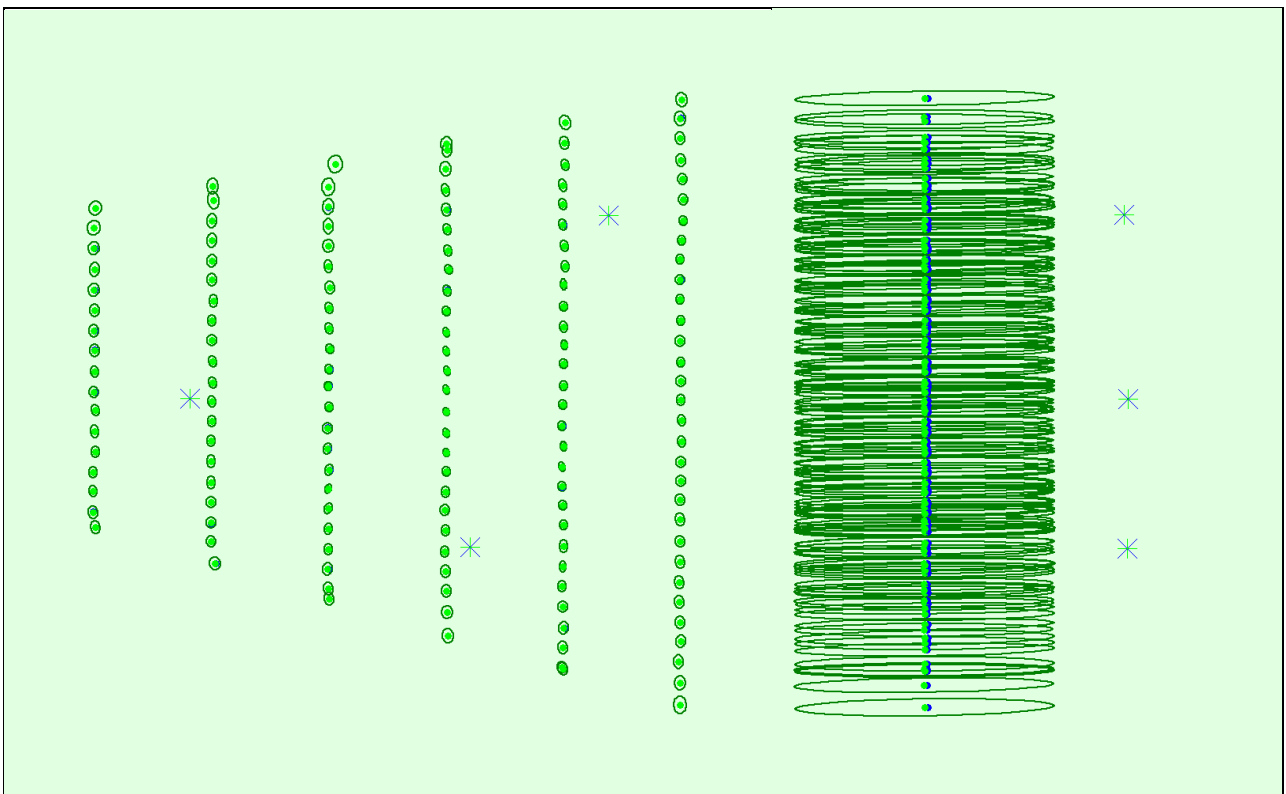
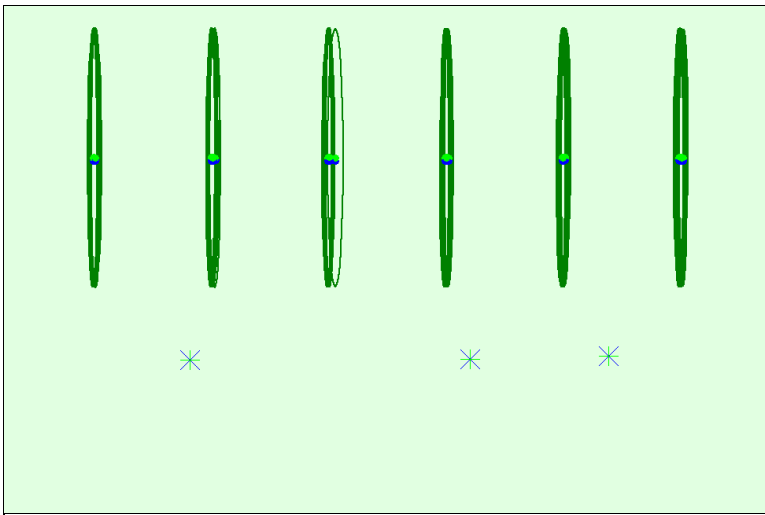


Figure 2: Top view of the initial image position. The green line follows the position of the images in time starting from the large blue dot.

Computed Image/GCPs/Manual Tie Points Positions





Uncertainty ellipses 500x magnified

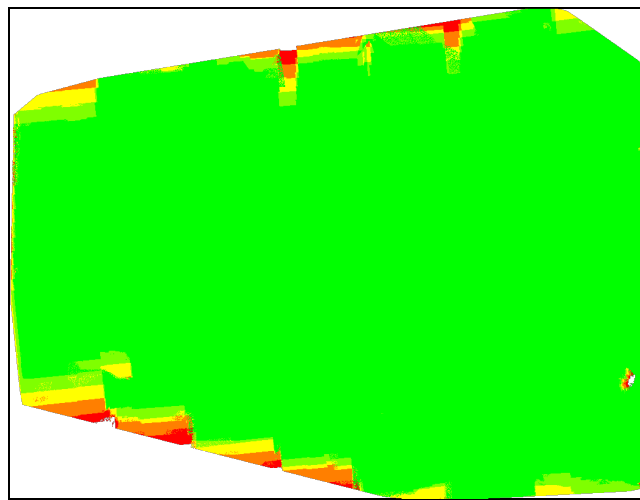
Figure 3: Offset between initial (blue dots) and computed (green dots) image positions as well as the offset between the GCPs initial positions (blue crosses) and their computed positions (green crosses) in the top-view (XY plane), front-view (XZ plane), and side-view (YZ plane). Dark green ellipses indicate the absolute position uncertainty of the bundle block adjustment result.

? Absolute camera position and orientation uncertainties



	X [US survey foot]	Y [US survey foot]	Z [US survey foot]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.006	0.007	0.158	0.003	0.003	0.001
Sigma	0.001	0.001	0.000	0.001	0.000	0.001

? Overlap



Number of overlapping images: 1 2 3 4 5+

Figure 4: Number of overlapping images computed for each pixel of the orthomosaic. Red and yellow areas indicate low overlap for which poor results may be generated. Green areas indicate an overlap of over 5 images for every pixel. Good quality results will be generated as long as the number of keypoint matches is also sufficient for these areas (see Figure 5 for keypoint matches).

Bundle Block Adjustment Details



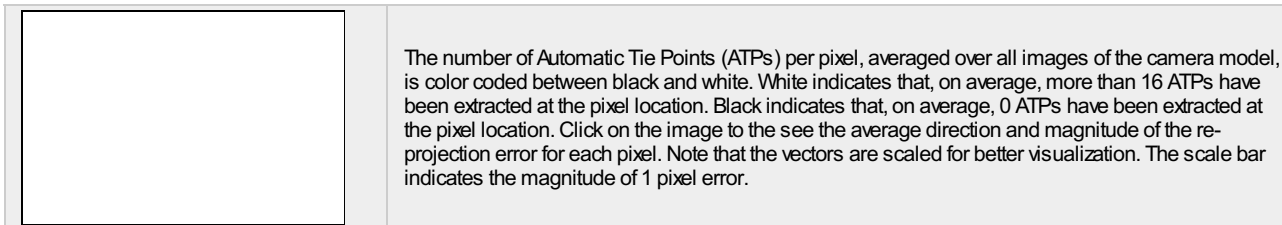
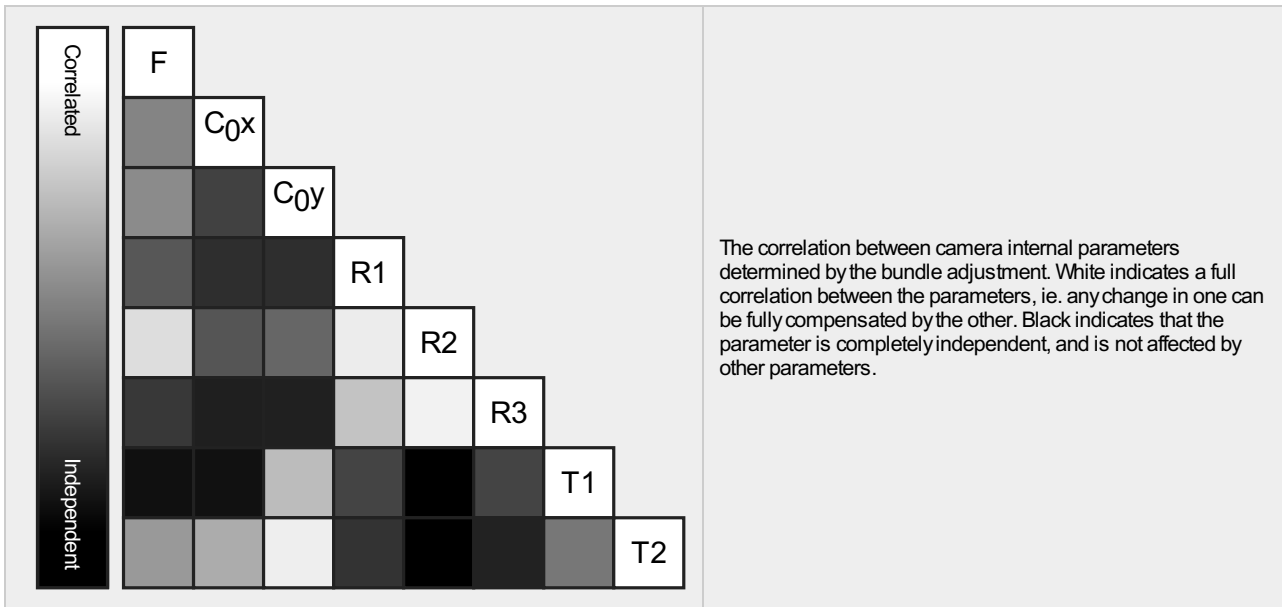
Number of 2D Keypoint Observations for Bundle Block Adjustment	2490596
Number of 3D Points for Bundle Block Adjustment	731691
Mean Reprojection Error [pixels]	0.192

Internal Camera Parameters

FC6310R_8.8_5472x3648 (RGB). Sensor Dimensions: 12.833 [mm] x 8.556 [mm]

EXIF ID: FC6310R_8.8_5472x3648

	Focal Length	Principal Point x	Principal Point y	R1	R2	R3	T1	T2
Initial Values	3658.300 [pixel] 8.580 [mm]	2722.500 [pixel] 6.385 [mm]	1835.100 [pixel] 4.304 [mm]	-0.269	0.112	-0.033	0.000	-0.001
Optimized Values	3749.636 [pixel] 8.794 [mm]	2734.821 [pixel] 6.414 [mm]	1829.462 [pixel] 4.291 [mm]	-0.012	0.001	0.008	0.000	-0.000
Uncertainties (Sigma)	4.803 [pixel] 0.011 [mm]	0.090 [pixel] 0.000 [mm]	0.085 [pixel] 0.000 [mm]	0.000	0.000	0.000	0.000	0.000



2D Keypoints Table

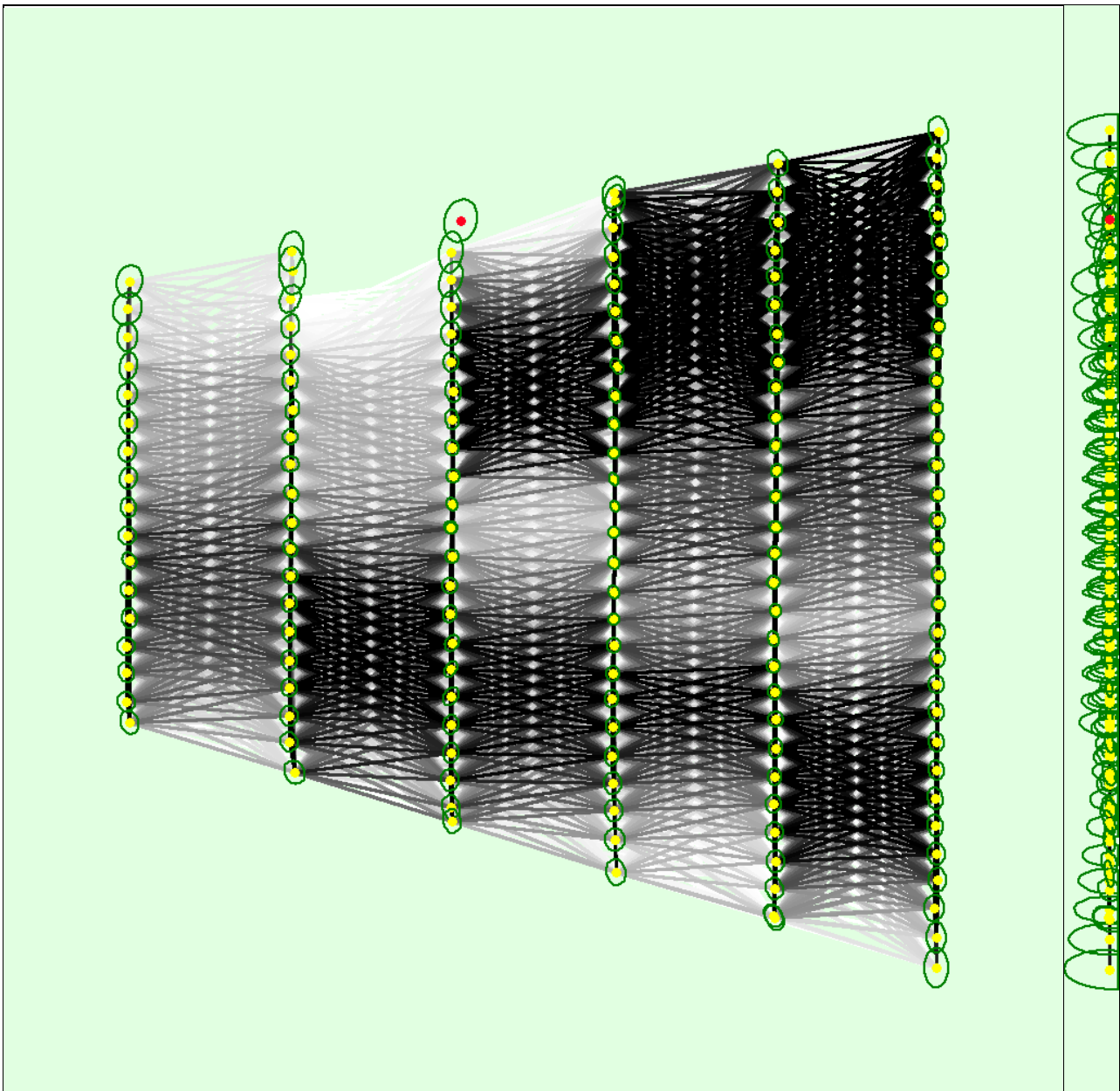
	Number of 2D Keypoints per Image	Number of Matched 2D Keypoints per Image
Median	63243	16235
Mn	42024	45
Max	79899	28270
Mean	62838	16943

3D Points from 2D Keypoint Matches

	Number of 3D Points Observed
In 2 Images	412054
In 3 Images	125604
In 4 Images	62555
In 5 Images	37678
In 6 Images	25425
In 7 Images	17487
In 8 Images	12992
In 9 Images	9618
In 10 Images	6448

In 11 Images	3993
In 12 Images	3321
In 13 Images	2869
In 14 Images	2388
In 15 Images	1971
In 16 Images	1644
In 17 Images	1380
In 18 Images	1174
In 19 Images	982
In 20 Images	589
In 21 Images	347
In 22 Images	279
In 23 Images	224
In 24 Images	197
In 25 Images	178
In 26 Images	107
In 27 Images	96
In 28 Images	49
In 29 Images	35
In 30 Images	7

2D Keypoint Matches



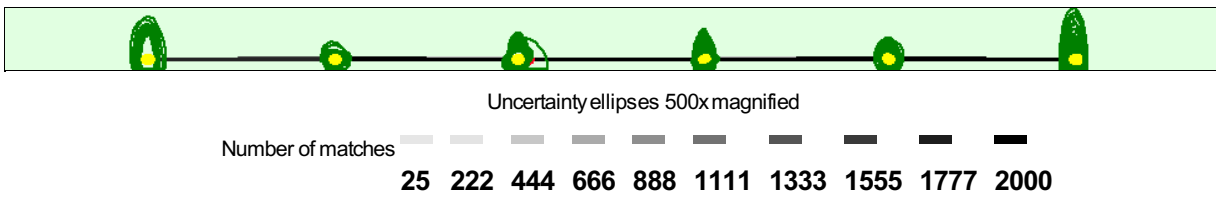


Figure 5: Computed image positions with links between matched images. The darkness of the links indicates the number of matched 2D keypoints between the images. Bright links indicate weak links and require manual tie points or more images. Dark green ellipses indicate the relative camera position uncertainty of the bundle block adjustment result.

Relative camera position and orientation uncertainties

	X [US survey foot]	Y [US survey foot]	Z [US survey foot]	Omega [degree]	Phi [degree]	Kappa [degree]
Mean	0.007	0.009	0.014	0.010	0.013	0.002
Sigma	0.002	0.003	0.008	0.006	0.007	0.001

Geolocation Details

Ground Control Points

GCP Name	Accuracy XYZ [US survey foot]	Error X [US survey foot]	Error Y [US survey foot]	Error Z [US survey foot]	Projection Error [pixel]	Verified/Marked
2000 (3D)	0.020/ 0.020	0.012	-0.004	0.001	0.584	8 / 8
2001 (3D)	0.020/ 0.020	-0.007	0.018	-0.001	0.361	8 / 8
2002 (3D)	0.020/ 0.020	-0.005	-0.015	0.001	0.403	8 / 8
Mean [US survey foot]		-0.000098	0.000004	0.000265		
Sigma [US survey foot]		0.008515	0.013756	0.001144		
RMS Error [US survey foot]		0.008516	0.013756	0.001174		

0 out of 3 check points have been labeled as inaccurate.

Check Point Name	Accuracy XYZ [US survey foot]	Error X [US survey foot]	Error Y [US survey foot]	Error Z [US survey foot]	Projection Error [pixel]	Verified/Marked
2003		-0.0283	0.0284	-0.1948	0.8963	8 / 8
2004		0.0293	-0.0725	-0.0240	0.5660	8 / 8
2005		-0.0039	0.0943	0.0470	0.7793	4 / 4
Mean [US survey foot]		-0.000952	0.016747	-0.057281		
Sigma [US survey foot]		0.023610	0.068605	0.101470		
RMS Error [US survey foot]		0.023629	0.070619	0.116522		

Localisation accuracy per GCP and mean errors in the three coordinate directions. The last column counts the number of calibrated images where the GCP has been automatically verified vs. manually marked.

Absolute Geolocation Variance

Mn Error [US survey foot]	Max Error [US survey foot]	Geolocation Error X [%]	Geolocation Error Y [%]	Geolocation Error Z [%]
-	-0.15	0.00	0.68	0.00
-0.15	-0.12	0.00	0.00	0.00
-0.12	-0.09	0.00	0.00	0.00
-0.09	-0.06	2.04	1.36	0.68
-0.06	-0.03	10.20	13.61	10.20

-0.03	0.00	37.41	34.01	38.10
0.00	0.03	38.10	34.69	42.18
0.03	0.06	10.20	14.97	8.16
0.06	0.09	1.36	0.00	0.00
0.09	0.12	0.68	0.00	0.68
0.12	0.15	0.00	0.68	0.00
0.15	-	0.00	0.00	0.00
Mean [US survey foot]		0.046218	-0.006600	-1.840238
Sigma [US survey foot]		0.027785	0.031430	0.025220
RMS Error [US survey foot]		0.053927	0.032116	1.840411

Min Error and Max Error represent geolocation error intervals between -1.5 and 1.5 times the maximum accuracy of all the images. Columns X, Y, Z show the percentage of images with geolocation errors within the predefined error intervals. The geolocation error is the difference between the initial and computed image positions. Note that the image geolocation errors do not correspond to the accuracy of the observed 3D points.

Geolocation Bias	X	Y	Z
Translation [US survey foot]	0.046087	-0.006504	-1.840362

Bias between image initial and computed geolocation given in output coordinate system.

Relative Geolocation Variance

Relative Geolocation Error	Images X [%]	Images Y [%]	Images Z [%]
[-1.00, 1.00]	95.24	95.24	98.64
[-2.00, 2.00]	100.00	98.64	100.00
[-3.00, 3.00]	100.00	99.32	100.00
Mean of Geolocation Accuracy [US survey foot]	0.054011	0.054011	0.085753
Sigma of Geolocation Accuracy [US survey foot]	0.001641	0.001641	0.004531

Images X, Y, Z represent the percentage of images with a relative geolocation error in X, Y, Z.

Geolocation Orientational Variance	RMS [degree]
Omega	0.410
Phi	0.358
Kappa	5.338

Geolocation RMS error of the orientation angles given by the difference between the initial and computed image orientation angles.

Initial Processing Details

System Information

Hardware	CPU: 11th Gen Intel(R) Core(TM) i9-11900H @ 2.50GHz RAM: 32GB GPU: Intel(R) UHD Graphics (Driver: 30.0.101.1029), NVIDIA GeForce RTX 3070 Laptop GPU (Driver: 30.0.14.7141)
Operating System	Windows 10 Home, 64-bit

Coordinate Systems

Image Coordinate System	WGS 84
Ground Control Point (GCP) Coordinate System	NAD83(2011) / Rhode Island (ftUS) (-100US survey foot)
Output Coordinate System	NAD83(2011) / Rhode Island (ftUS) (-100US survey foot)

Processing Options

Detected Template	No Template Available
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Keypoints Image Scale	Full, Image Scale: 1
Advanced: Matching Image Pairs	Aerial Grid or Corridor
Advanced: Matching Strategy	Use Geometrically Verified Matching: yes
Advanced: Keypoint Extraction	Targeted Number of Keypoints: Automatic
Advanced: Calibration	Calibration Method: Geolocation Based Internal Parameters Optimization: All External Parameters Optimization: All Rematch: Auto, yes

Point Cloud Densification details



Processing Options



Image Scale	multiscale, 1/2 (Half image size, Default)
Point Density	Optimal
Minimum Number of Matches	3
3D Textured Mesh Generation	no
LOD	Generated: no
Advanced: Image Groups	group1
Advanced: Use Processing Area	yes
Advanced: Use Annotations	yes
Time for Point Cloud Densification	09m:50s
Time for Point Cloud Classification	03m:09s
Time for 3D Textured Mesh Generation	NA

Results



Number of Generated Tiles	1
Number of 3D Densified Points	13263338
Average Density (per US survey foot ³)	74.95

DSM, Orthomosaic and Index Details



Processing Options



DSM and Orthomosaic Resolution	1 x GSD (1 [cm/pixel])
DSM Filters	Noise Filtering: yes Surface Smoothing: yes, Type: Sharp
Raster DSM	Generated: yes Method: Inverse Distance Weighting Merge Tiles: yes
Orthomosaic	Generated: yes Merge Tiles: yes GeoTIFF Without Transparency: no Google Maps Tiles and KML: no
Time for DSM Generation	07m:53s
Time for Orthomosaic Generation	09m:30s
Time for DTM Generation	00s
Time for Contour Lines Generation	00s
Time for Reflectance Map Generation	00s
Time for Index Map Generation	00s